

ACCESSION #: 9610160066

LICENSEE EVENT REPORT (LER)

FACILITY NAME: H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT PAGE: 1  
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NO. 2

DOCKET NUMBER: 05000261

TITLE: MANUAL INITIATION OF REACTOR PROTECTION SYSTEM (RPS) DUE  
TO TURBINE GOVERNOR VALVE FAILURE

EVENT DATE: 09/07/96 LER #: 96-004-00 REPORT DATE: 10/07/96

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: N POWER LEVEL: 028

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR  
SECTION:

50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:

NAME: A.L. Garrou, Manager - Licensing/ TELEPHONE: (803) 857-1544

Regulatory Programs (Acting)

COMPONENT FAILURE DESCRIPTION:

CAUSE: X SYSTEM: JJ COMPONENT: EHC MANUFACTURER: W120

REPORTABLE NPRDS: NO

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT:

On September 7, 1996, the H. B. Robinson Steam Electric Plant (HBRSEP), Unit No. 2 was operating at 28 % power. Operations personnel were performing a scheduled shutdown of the plant to begin Refueling Outage (RO) 17. At 2241 hours Eastern Daylight Time (EDT), the High Pressure (HP) Turbine Electro-Hydraulic Control (EHC)

System failed in both the automatic and the manual control modes. Because the EHC System failed, HP Turbine Governor Valve (GV)-1 would not close in response to manual or automatic control signals. After operations personnel determined that no immediate repairs could be made that would enable continuation of the plant shutdown, the Reactor Protection System (RPS) was manually initiated and the reactor was tripped at 2313 hours. All reactor control rods fully inserted into the reactor core and affected systems responded as designed, except that Main Feedwater Pump "A" tripped on low feedwater flow. Following the manual actuation of the RPS, operations personnel placed the plant in a cold shutdown condition. The event was caused by a component failure. A broken wire was found in the EHC housing to valve GV-1. The broken wire was caused by wire fatigue induced by vibration. Also, broken bolts were found on the electro-hydraulic controller housing terminal block and evidence of wire fatigue was determined to be induced from de-termination and re-termination of wires during previous maintenance activities. The broken wire in the governor valve electro-hydraulic controller was repaired, and the electro-hydraulic controller housings of all governor valves are being repaired to eliminate loose and broken bolts, and to eliminate sources of wire fatigue at the terminal blocks.

This event is reported pursuant to 10 CFR 50.73(a)(2)(iv) as a manual actuation of the RPS.

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## I. DESCRIPTION

On September 7, 1996, the H. B. Robinson Steam Electric Plant (HBRSEP), Unit No. 2 was operating at 28 percent power. Operations personnel were performing a scheduled shutdown of the plant to begin Refueling Outage (RO) 17. At 2241 hours Eastern Daylight Time (EDT), the High Pressure (HP) Turbine (EIIS System Code: TA) Electro-Hydraulic Control (EHC) System (EIIS System Code: JJ) failed in both the automatic and the manual control modes. Because the EHC System failed, HP Turbine Governor Valve (GV)-1 (EIIS Component Code: FCV) would not close in response to manual or automatic signals from the Reactor Turbine Generator Board (RTGB) (EIIS Component Code: MCBT). Operations personnel then stabilized the

plant at 28 percent power. After operations personnel determined that no immediate repairs could be made that would enable the EHC System to function and allow the plant shutdown to continue, the Reactor Protection System (RPS) (EIS System Code: JD) was manually initiated and the reactor was tripped at 2313 hours on September 7, 1996. All reactor control rods (EIS System Code: AA) fully inserted into the reactor core and affected systems responded as designed, except that Main Feedwater (MFW) Pump "A" (EIS System Code: SK) tripped on low feedwater flow. The low feedwater flow was caused by failure of Flow Control Valve (FCV)-1442 (EIS Component Code: FCV) to open, which recirculates feedwater from MFW Pump "A" to the condenser, and by failure of valve FCV-1446 to open, which circulates feedwater from the gland steam condenser to the condenser. Following the manual actuation of the RPS, operations personnel continued to bring the plant to a cold shutdown condition in accordance with the RO 17 schedule.

The NRC was notified of this event at 2354 hours via the Federal Telephone System (FTS) in accordance with 10 CFR 50.72(b)(2)(ii), as a manual actuation of the RPS.

## II. CAUSE OF EVENT

The event was caused by a component failure. Subsequent investigation found a broken wire in the EHC (EIS Component Code: HCU) housing to Valve GV-1. The broken wire interrupted the electrical signal from the EHC System to the electro-hydraulic controller for Valve GV-1 and

prevented the valve controller from responding to any signal to open or close, except for a turbine trip signal. The broken wire was caused by wire fatigue induced by vibration. Inspection of the electro-hydraulic controller housing for valve GV-1 found broken bolts on the terminal block and evidence of wire fatigue induced by determination and re-termination of wires from the housing terminal block during previous periodic maintenance activities.

### III. ANALYSIS OF EVENT

This event had no significant impact on plant safety. The EHC System provides control and trip functions to the HP Turbine governor valves. Steam enters the HP Turbine through two stop valves and four governor valves.

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### III. ANALYSIS OF EVENT (continued)

The governor valves control the amount of steam admitted to the HP Turbine in response to EHC signals controlled from the RTGB. The EHC System provides an electrical control signal to the electro-hydraulic, servo-actuator controls on each governor valve. The trip function of the governor valves was unaffected by the event, and the governor valves closed as required when the turbine was tripped in response to the RPS actuation. Control of the governor valves is not a safety related function and is not assumed to mitigate accidents analyzed in Chapter 15 of the Updated Final Safety Analysis Report. The HP Turbine stop valves

and the trip function of the governor valves are credited with mitigating a turbine overspeed event which could generate turbine missiles. Since the turbine stop valves and the trip function of the governor valves were unaffected, and the stop valves and governor valves would have functioned to mitigate a turbine overspeed, this event had little or no adverse impact on plant safety. The necessary protective systems operated as designed.

By letter dated April 4, 1996, we provided a response to Requested Action (4) to NRC Bulletin 96-01, "Control Rod Insertion Problems," dated March 8, 1996. Requested Action (4) states, "For each reactor trip during each calendar year 1996, verify that all control rods have promptly fully inserted (i.e., bottomed) and obtain other available information to assess the operability and any performance trends of the rods. In the event that all rods do not fully insert promptly, conduct tests to measure and evaluate rod drop times and rod recoil." Our response stated in part that, "For any of the control rods that do not indicate a rod bottom position, and the control rod is subsequently determined not to be fully inserted, then the control rod drop and recoil will be measured and evaluated. All control rods will be considered operable based on [Beginning Of Cycle] BOC rod drop testing results and biweekly rod exercise tests until there is evidence of incomplete control rod insertion, or a significant adverse trend in the control rod drop times. When the reactor was tripped, the rod bottom lights for reactor control

rods "B-10" and "H-8" did not illuminate immediately. The rod bottom light for reactor control rod "H-8" illuminated in approximately 30 seconds; the rod bottom light for reactor control rod "B-10" illuminated in approximately 41 minutes; and, the reactor control rods were subsequently determined to be fully inserted. The control rod drop times and recoil were tested successfully at hot shutdown conditions prior to proceeding to cold shutdown conditions.

This event is reported pursuant to 10 CFR 50.73(a)(2)(iv) as a manual actuation of the RPS.

#### IV. CORRECTIVE ACTIONS

The broken wire in the Governor Valve GV-1 electro-hydraulic controller housing was repaired.

The electro-hydraulic controller housings for all governor valves are being inspected and repaired to eliminate loose and broken bolts, and to eliminate sources of wire fatigue at the terminal blocks.

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#### V. ADDITIONAL INFORMATION

##### A. Failed Component Information

EHC Unit (EHS Component Code: HCU)

##### B. Previous Similar Events

None.

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10 CFR 50.73

CP&L

Carolina Power & Light Company

Robinson Nuclear Plant

3581 West Entrance Road

Hartsville SC 29550

Robinson File No: 13510C

Serial: RNP-RA/96-0174

OCT 07 1996

United States Nuclear Regulatory Commission

Attn: Document Control Desk

Washington, DC 20555

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2

DOCKET NO. 50-261/LICENSE NO. DPR-23

LICENSEE EVENT REPORT NO. 96-004-00

Gentlemen:

The enclosed Licensee Event Report (LER), is submitted in accordance with 10 CFR 50.73. Since this LER covers a manual actuation of the Reactor Protection System (RPS) resulting in a reactor trip, this letter also serves as notification that all reactor control rods fully inserted into the reactor core, and the actions we committed to in our letter dated April 4, 1996, in responding to Requested Action (4) of NRC Bulletin 96-01, "Control Rod Insertion Problems," dated March 8, 1996, were carried out. This report is required to be submitted to the NRC by

October 7, 1996.

Very truly yours,

D. E. Young

Plant General Manager

Enclosure

c: Mr. S. D. Ebnetter, Regional Administrator, USNRC, Region II

Ms. B. L. Mozafari, USNRC Project Manager, HBRSEP

Mr. J. Zeiler, USNRC Resident Inspector, HBRSEP

Highway 151 and SC 23 Hartsville SC

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